

UNDERSTANDING MARGIN-OF-ERROR

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HOW TO USE AND UNDERSTAND ACS DATA

- Sample size and sampling error
- Standard error
- Margin of error
- Confidence intervals
- Statistical testing

ACS ESTIMATES AND SAMPLE SIZE

- Estimates are based on a sample of the population

Year	Final Interviews (Maryland)	Housing Units Estimate (Maryland)	Percent
2017	36,181	2,449,123	1.48%
2016	37,881	2,447,211	1.55%
2015	38,956	2,434,465	1.60%
2014	39,331	2,422,317	1.62%
2013	37,688	2,404,177	1.57%

SAMPLING ERROR & STANDARD ERROR

- **Sampling Error** occurs when estimates are derived from a sample rather than a census (complete count) of the population.
- **Standard Error** is an estimate of sampling error – how precise the survey estimates are to the true population you are trying to measure

SAMPLING ERROR & MARGIN OF ERROR

- **Margin of Error** = standard error for a given confidence interval (typically 90 percent). A measure of the precision of the estimate at a given confidence interval
- Sampling error in the ACS is reported as the estimate “plus or minus” the margin of error

MARGIN OF ERROR (MOE)

- **MOE = 1.645 * Standard Error**
where 1.645 is used for the 90 pct. confidence interval (CI)
(use 1.960 for 95% CI; for 99% use 2.576)
- **Use the MOE to construct the Lower and Upper bounds around the estimate**
- **Lower Bound = (estimate – MOE)**
- **Upper Bound = (estimate + MOE)**

MEDIAN HOUSEHOLD INCOME FOR MARYLAND FROM 2017 ACS

The screenshot shows the American FactFinder interface. At the top, there is a navigation bar with options: MAIN, COMMUNITY FACTS, GUIDED SEARCH, ADVANCED SEARCH, and DOWNLOAD CENTER. Below this, a header reads "Advanced Search - Search all data in American FactFinder". Two tabs are visible: "1 Advanced Search" and "2 Table Viewer". The search results display the code "B19013" and the title "MEDIAN HOUSEHOLD INCOME IN THE PAST 12 MONTHS (IN 2017 INFLATION-ADJUSTED DOLLARS)" with a sub-note "Universe: Households" and "2017 American Community Survey 1-Year Estimates". A "Table View" button is present. Below the table view, there are action links: "Modify Table", "Add/Remove Geographies", "Bookmark/Save", "Print", "Download", and "Create a Map".

Although the American Community Survey (ACS) produces population, demographic and housing unit estimates, it is the Census Bureau's Population Estimates Program that produces

Versions of this table are available for the following years: 2017 2016 2015 2014 2013	Maryland		
		Estimate	Margin of Error
	Median household income in the past 12 months (in 2017 inflation-adjusted dollars)	80,776	+/-707

MEDIAN HOUSEHOLD INCOME FOR MARYLAND FROM 2017 ACS

- 90% CI = \$80,776 +/- 707
= \$80,069 to \$81,483
- There is a nine-out-of-ten, or 90 % chance, that the interval contains the “true” value that you would have gotten from a full census

WHY MARGINS OF ERROR MATTERS

- Lets you know how good the data is
- Saves you from drawing erroneous conclusions
- Helps you decide how confident you can be about the assertions you make

COMPARING ESTIMATES

- If have two estimates, need to determine if the apparent differences are:
 - Likely due to chance
 - Likely represent a true difference that exists in the population as a whole
- A “statistically significant difference” means that there is statistical evidence that there is a difference

COMPARING ESTIMATES

- If the confidence intervals of two estimates do not overlap, then the difference between the two estimates are statistically significant
- If the confidence intervals of two estimates do overlap, then the difference between the two estimates may or may not be statistically significant (will need to test)

TESTING STATISTICAL SIGNIFICANCE

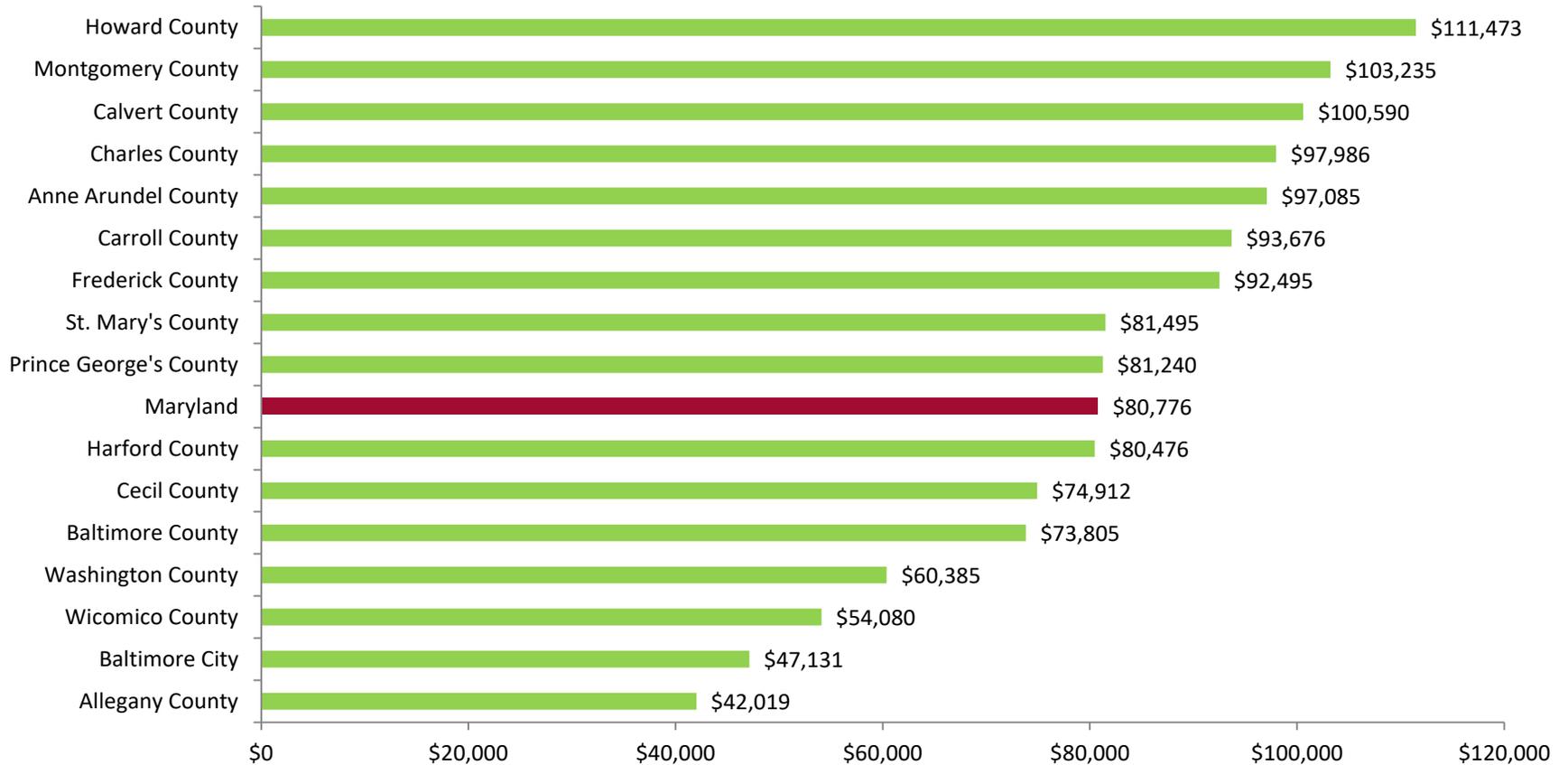
- Absolute value of Difference = $ABS(a, b)$
- $SE(a) = MOE(a)/1.645$
- $SE(b) = MOE(b)/1.645$
- $SE(a, b) = \sqrt{[SE(a)]^2 + [SE(b)]^2}$
- $MOE(a, b) = SE(a, b) * 1.645$
- $ABS(a, b) \leftrightarrow MOE(a, b)$

TESTING STATISTICAL SIGNIFICANCE

1. If $ABS(a, b) > MOE(a, b)$, then the difference between the two estimates are statistically significant
2. If $ABS(a, b) < MOE(a, b)$, then the difference between the two estimates are NOT statistically significant

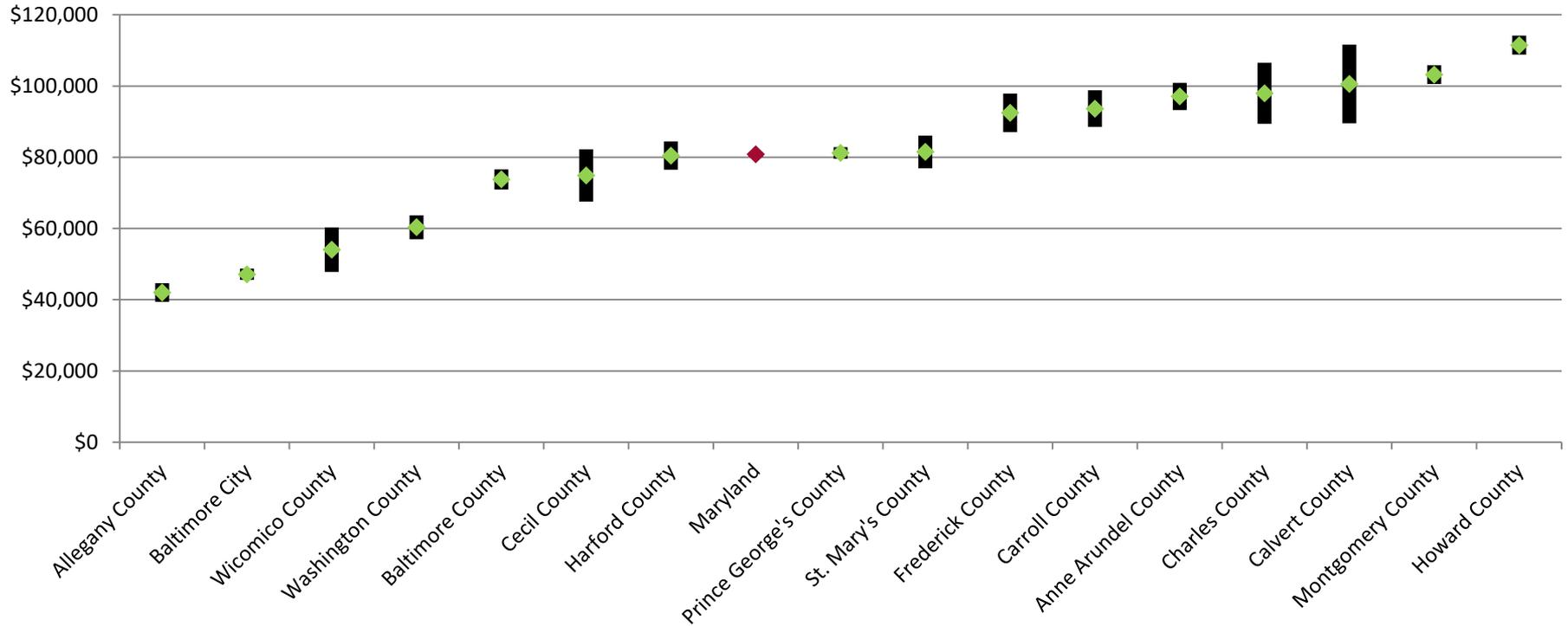
MEDIAN HOUSEHOLD INCOME IN MARYLAND AND ITS JURISDICTIONS, 2017

(IN 2017 INFLATION-ADJUSTED DOLLARS)



MEDIAN HOUSEHOLD INCOME IN MARYLAND AND ITS JURISDICTIONS, 2017

(IN 2017 INFLATION-ADJUSTED DOLLARS, WITH MOE)



2017 MEDIAN HOUSEHOLD INCOME

County	Median HH Income	Margin of Error	Lower Bound	Upper Bound
Howard County	111,473	2,666	108,807	114,139
Montgomery County	103,235	2,632	100,603	105,867
Calvert County	100,590	11,000	89,590	111,590
Charles County	97,986	8,556	89,430	106,542
Anne Arundel County	97,085	3,840	93,245	100,925

SIGNIFICANCE TEST WORKSHEET

- Go to Statistical Calculations Excel File

RESOURCES

Calculations of Statistical Significance & MOEs of
Combinations of ACS Data

https://planning.maryland.gov/MSDC/Documents/American_Community_Survey/StatisticalCalculationsMenu_ForWEB.xls

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